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Graduate Degree Attainment in the Teacher Workforce:

Patterns and Evidence of Impact

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Report Overview

Teachers play a critical role in shaping student success, and the attainment of a graduate degree, particularly a master's degree, has been frequently regarded as an indicator of teacher effectiveness. Many states and school districts encourage or require graduate education, with 88% of large districts incorporating master's degree attainment into teacher compensation structures (Nittler, 2018). However, researchers have often uncovered complex and mixed results on the impact of graduate degree attainment on student and teacher outcomes.

This report examines national and Midwest[1] state trends in teacher graduate degree attainment with an emphasis on master's degrees, highlighting differences by urbanization, school socioeconomic status, and program major. It also examines rates of major-subject congruence; that is, the alignment between a teacher's graduate degree and their classroom teaching assignment. An overview is then provided of research on the effects of graduate education on student and teacher outcomes. Finally, the report presents several options to improve policies and outcomes related to teacher graduate education, including defining policy goals, improving major-subject congruence, strengthening graduate program quality, broadening effectiveness measures, and enhancing data collection.

RESEARCH HIGHLIGHTS

» **Master's Degree Attainment:** Nationally, in 2020-21, 60% of public school teachers held a master's degree, the most common level of graduate education, though this rate varies significantly across states. In the Midwest, Ohio (71%), Illinois (70%), Nebraska (64%), Minnesota (66%), and Missouri (66%) surpassed the national average for teachers holding master's degrees. Within states, teachers in urban and suburban schools are more likely to hold master's degrees than those in rural or lower-income schools.

» **Master's Degree Major:** Nationally, in 2020-21, 12% of teachers' master's degrees were in non-curricular fields such as educational administration, whereas 38% were in general education fields (e.g., secondary education) and 46% were in subject-specific areas such as English and language arts. Major-subject congruence varies by school level and subject area. For instance, among teachers with a primary assignment in mathematics, major-subject congruence ranged from 36% among primary, middle, and combined school math teachers to 54% among high school math teachers.

» **Student Test Scores**: The effect of teachers holding a graduate degree on student test performance varies by school level, subject area, and the extent to which the degree aligns with teachers' instructional content. Generally, positive effects of in-area graduate degrees have been most consistently documented in STEM subject areas. Conversely, across all school levels, having a graduate degree outside one's primary teaching area was generally linked to null or negative outcomes for student achievement.

- **Elementary Schools:** At the elementary level, most research finds no effect of

[1] Consistent with the U.S. Census Bureau's regional designations, the Midwest is defined to include Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

graduate degrees on student reading outcomes, though some positive impacts appear for math and science achievement.

- **Middle Schools:** Middle school studies suggest a positive effect of graduate degrees on student math achievement, while findings for reading achievement generally indicate no effect.
- **High Schools**: In high schools, evidence of a positive impact was strongest for in-area graduate degrees on math achievement, and one study indicated positive effects in science and social studies when teachers acquire in-area degrees.

» **Postsecondary Impact:** Emerging research indicates that the effects of teacher qualifications are not merely additive but accumulate over time, shaping long-term student success. Sustained exposure to mathematics and science teachers with graduate degrees over multiple years was associated with a 21% increase in the odds of students completing a postsecondary degree after high school graduation.

» **Teacher Impact:** Teachers with graduate degrees (particularly in-area degrees) receive better principal evaluation ratings, exhibit higher self-efficacy in instructional practices and classroom management, and are just as likely to remain in the profession as those with only a bachelor's degree.

Policy Options

» **Defining Policy Objectives:** To better align incentives, evaluation frameworks, and outcomes, states and districts can consider moving beyond one-size-fits-all salary premiums for graduate education towards a more targeted approach based on clearly defined policy objectives and attentive to differences by school level, subject area, and teachers' career goals and trajectories.

» **Promoting In-Area Majors:** The impact of graduate degree attainment can be improved by prioritizing and incentivizing graduate education in programs that align with teachers' classroom subject areas.

» **Strengthening Graduate Teacher Preparation:** States and school districts, in partnership with accreditation agencies and universities, can establish clear quality standards for graduate programs used for professional development, ensuring coursework aligns with evidence-based instructional practices, subject-specific content, and practice-based learning experiences.

» **Broadening Effectiveness Measures:** To strengthen teacher quality policies, states and districts can supplement graduate degree attainment with additional measures such as years of experience, major-subject alignment, teacher knowledge assessments, National Board certification, classroom evaluations, and value-added or student growth scores in tested subjects.

» **Improving Data Collection and Reporting:** Efforts to improve teacher preparation policies would benefit from detailed data on teacher qualifications, instructional assignments, and a comprehensive range of short- and long-term student outcomes, which could be provided through statewide longitudinal data systems.

Introduction

Extensive research over several decades has confirmed that effective school teachers can have substantial impacts on students' academic achievements (Wayne & Youngs, 2003) as well as their life-long success (Chetty et al., 2011; Chetty, Friedman, & Rockoff, 2014). While teacher quality comprises many attributes, graduate degree attainment has frequently, though not universally, been regarded as a contributing factor (Sahlberg, 2015). Many school districts and states have encouraged, incentivized, or required teachers to pursue graduate education at some level, particularly master's degrees. Graduate-level credits are widely accepted by state departments of education for teacher licensure renewal (Tooley & White, 2018), and several states require (Connecticut, Maryland, and New York) or encourage (Massachusetts, Michigan, Missouri, and Oregon) a master's degree or its equivalent in coursework for professional licensure or career advancement (National Council on Teacher Quality, 2017).[2] Financial incentives are also in place. According to 2018 data from the National Council on Teacher Quality, 88% of large school districts considered a master's degree in teacher compensation (Nittler, 2018). Moreover, in 2020–21, the average base salary for full-time public school teachers with a master's degree ($66,960) was 22% higher than the salary of teachers with a bachelor's degree ($52,540) (U.S. Department of Education, 2022a).

Although graduate education is commonly treated as a key attribute of teacher effectiveness, variation in teacher educational attainment across and within states has not been thoroughly documented, and research perspectives differ about the true impact of graduate education on teaching quality and student achievement. This report explores these dimensions through national data, with a focus on Midwest states, and a review of recent research findings. It begins with an analysis of national and state educational attainment rates for teachers, emphasizing master's degree attainment due to its high prevalence and policy prominence. Next, it explores intrastate variations, highlighting differences based on school urbanization and the socioeconomic status of the student body. The report then examines the academic majors of teachers' master's degrees, including the alignment between teachers' degrees and their teaching assignments. A summary of research on student outcomes follows, showing the average effects of teachers' graduate degrees on test performance; the role of major-subject congruence; the impact of cumulative exposure to highly educated teachers; and the influence of graduate education on teacher outcomes. The report concludes with policy considerations for enhancing teacher effectiveness through graduate education.

State Educational Attainment Rates

Teachers report attaining varying levels of education across the country partly due to differences in licensure requirements, professional development incentives, the use of alternative or emergency certification, and local school district policies. These credentials include associate degrees, bachelor's degrees (the entry-level qualification for most teaching positions), master's degrees, education specialist certificates or certificates of advanced graduate studies (i.e., post-master's certificates), and doctoral or professional degrees.[3] Data for the following analyses are derived from the National Teacher and Principal Survey, 2020-21 (NTPS). The selected samples include about 9,900 public schools and 68,300 public school teachers.[4]

Overall Educational Attainment

Table 1 shows the highest degree attained among public school teachers. Nationally, the majority of

[2] Internationally, a master's degree requirement remains common in many developed countries, particularly in the European Union. At the primary level, a master's degree is required in ten European countries. To teach at a lower secondary level, half of the EU systems set the minimum qualification at the master's level. To teach in upper secondary schools in the EU, a bachelor's degree is sufficient to qualify only in seven countries: Bulgaria, Ireland, Greece, Cyprus, Latvia, Lithuania, and Malta. In all other EU countries, teachers need a master's degree as a minimum qualification (European Commission, 2019).

[3] This analysis does not address other important aspects of teacher credentialing, including pathways to licensure (Jang & Horn, 2017a) or professional certifications such as the National Board for Professional Teaching Standards (Jang & Horn, 2017b).

[4] All national and state-level descriptive statistics in this report are weighted using the NTPS teacher weight variable (WTA000), which adjusts for sampling design and nonresponse. The 2020–21 NTPS was designed to produce representative estimates of public school teachers for all 50 states and the District of Columbia. Estimates with relative standard errors of 30% or more were suppressed. All analyses were conducted using NCES PowerStats.

TABLE 1. Highest Degree Attained Among Public School Teachers, 2020-21

	HIGHEST DEGREE ATTAINED				ANY GRADUATE CREDENTIAL
	Associate or no college degree	Bachelor's Degree	Master's Degree	Post-Master's Credential	Master's Degree or Higher
U.S.	0.8	38.2	51.2	9.8	61.0
Alabama	-	33.8	53.1	11.4	64.5
Alaska	-	37.1	52.8	9.1	61.9
Arizona	1.8	44.6	45.3	8.3	53.6
Arkansas	-	42.9	48.3	8.1	56.4
California	0.6	36.3	47.4	15.7	63.1
Colorado	-	35.1	55.7	8.4	64.1
Connecticut	-	9.5	70.5	19.1	89.6
Delaware	-	26.7	63.7	9.4	73.1
District of Columbia	-	26.6	62.9	10.5	73.4
Florida	-	54.5	38.4	6.7	45.1
Georgia	-	27.9	45.2	25.9	71.1
Hawaii	-	42.7	45.2	10.8	56.0
Idaho	-	56.4	36.4	6.4	42.8
Illinois	-	29.2	62.4	8.2	70.7
Indiana	-	48.3	44.6	5.8	50.4
Iowa	-	52.5	42.2	4.5	46.8
Kansas	–	40.0	53.4	6.0	59.4
Kentucky	–	16.1	67.8	15.0	82.8
Louisiana	-	60.3	31.9	6.9	38.8
Maine	-	45.3	42.2	10.0	52.2
Maryland	-	26.1	57.3	15.7	73.1
Massachusetts	-	13.8	73.7	11.0	84.7
Michigan	-	29.2	61.5	7.8	69.4
Minnesota	-	31.9	56.9	10.7	67.6
Mississippi	-	45.0	45.1	9.4	54.5

	HIGHEST DEGREE ATTAINED				ANY GRADUATE CREDENTIAL
	Associate or no college degree	Bachelor's Degree	Master's Degree	Post-Master's Credential	Master's Degree or Higher
Missouri	-	32.5	56.2	8.4	64.6
Montana	-	46.9	47.0	5.9	52.8
Nebraska	-	35.0	58.8	6.0	64.7
Nevada	-	33.0	54.5	11.1	65.5
New Hampshire	-	33.9	56.4	8.8	65.2
New Jersey	-	42.6	46.6	10.8	57.4
New Mexico	-	41.6	51.1	6.4	57.6
New York	0.4	4.5	83.8	11.3	95.1
North Carolina	-	56.1	36.1	6.8	42.9
North Dakota	-	51.2	44.2	4.3	48.5
Ohio	-	27.3	63.5	7.9	71.3
Oklahoma	-	68.6	29.1	-	31.1
Oregon	-	18.2	72.1	9.1	81.2
Pennsylvania	-	26.1	62.1	11.7	73.8
Rhode Island	-	37.2	51.6	11.2	62.8
South Carolina	-	36.8	53.4	9.1	62.5
South Dakota	-	59.1	34.4	5.3	39.6
Tennessee	-	37.2	46.6	14.2	60.8
Texas	0.6	66.6	28.3	4.5	32.8
Utah	2.6	50.9	39.8	6.8	46.6
Vermont	-	37.2	54.6	7.9	62.5
Virginia	-	36.4	54.2	8.5	62.7
Washington	-	24.8	68.6	5.5	74.2
West Virginia	-	41.8	49.7	6.9	56.5
Wisconsin	-	43.5	47.4	9.0	56.4
Wyoming	-	43.7	47.5	8.5	56.1

Source: Authors' analysis of National Teacher and Principal Survey, 2020-21.

teachers hold either a bachelor's (38%) or master's degree (51%) as their highest degree, while 10% have attained a post-master's credential (i.e., education specialist, certificate, doctorate, professional degree). The relative proportions of teachers with a bachelor's degree and those with a graduate credential as their highest degree varies considerably across states. In the Midwest, Ohio (71%), Illinois (71%), Michigan (69%), Minnesota (68%), Nebraska (65%), and Missouri (65%) surpassed the national percentage of teachers holding a master's degree or higher (61%).

Master's Degree Attainment Rates

Table 2 delineates the percentage of teachers holding a master's degree,[5] categorized by primary, middle, combined (e.g., K-12), and high school levels.[6] Overall, 60% of U.S. public-school teachers hold a master's degree, regardless of their highest degree attained. In the Midwest, Ohio (71%), Illinois (70%), Nebraska (64%), Minnesota (66%), and Missouri (66%) surpassed the national average of 60% for teachers holding master's degrees. Some states beyond the Midwest, such as New York (95%) and Connecticut (90%), also provide notable comparisons, reflecting the impact of state licensure requirements that include master's degree attainment.

Nationally, the highest rate is among high school teachers, where 65% have attained a master's degree, compared to 57% of primary school teachers, 59% of combined school teachers, and 60% of middle school teachers. This pattern holds across most states in

TABLE 2. Percentage of Public School Teachers Holding at Least a Master's Degree by School Level, 2020-21

	Total	Primary	Middle	Combined	High
U.S.	60.1	56.9	59.8	59.1	65.4
Alabama	65.0	64.7	62.4	60.4	70.7
Alaska	61.3	53.7	58.8	65.3	74.6
Arizona	52.9	50.8	44.5	54.0	59.9
Arkansas	56.0	55.2	51.1	59.4	58.9
California	58.2	52.6	58.5	63.1	63.8
Colorado	63.1	52.8	64.5	66.5	74.4
Connecticut	90.3	91.7	90.7	85.4	89.6
Delaware	71.6	68.7	70.2	-	78.2
Dist. of Col.	70.4	74.7	55.2	-	77.2
Florida	44.2	39.2	41.4	58.2	52.3
Georgia	71.4	69.6	72.4	69.0	73.6
Hawaii	49.8	46.8	49.1	-	55.7
Idaho	41.8	38.1	39.9	41.1	49.4
Illinois	70.0	67.7	65.8	69.5	76.6
Indiana	49.7	40.8	48.2	48.0	67.9
Iowa	45.3	41.9	46.3	36.8	54.0
Kansas	58.7	54.8	60.0	48.3	68.1

[5] Dissimilar to Table 1, teachers who attained a post-Master's credential (e.g., Ed.D) without attaining a master's degree are excluded in Table 2.

[6] Primary schools include at least one grade lower than 5 and none higher than 8. Middle schools include no grade lower than 5 and none higher than 8. High schools include no grade lower than 7 and at least one grade higher than 8. Combined schools include configurations such as K–8, 6–12, or K–12, or any arrangement that spans non-contiguous traditional levels or includes only ungraded classes.

	Total	Primary	Middle	Combined	High
Kentucky	83.4	82.1	84.4	-	85.0
Louisiana	37.6	31.6	38.8	-	44.2
Maine	51.7	48.6	52.0	48.1	58.7
Maryland	72.0	71.3	69.3	-	76.3
Massachusetts	85.6	85.2	85.0	82.5	87.5
Michigan	69.3	66.6	74.3	61.1	72.4
Minnesota	66.4	70.3	68.2	47.7	70.7
Mississippi	54.8	47.3	54.8	59.1	62.8
Missouri	65.7	62.4	64.9	57.6	75.8
Montana	50.9	51.6	58.0	40.3	56.1
Nebraska	63.5	56.1	70.3	60.9	72.6
Nevada	65.7	62.5	67.8	64.8	69.2
New Hampshire	64.5	58.1	66.5	78.0	67.4
New Jersey	55.8	48.0	54.1	68.8	64.5
New Mexico	56.8	56.6	49.1	54.6	66.9
New York	95.2	96.6	94.3	92.7	94.9
North Carolina	41.4	35.1	41.7	40.4	51.2
North Dakota	47.5	36.0	50.5	38.6	73.8
Ohio	71.4	68.3	75.6	62.3	74.4
Oklahoma	31.0	27.3	30.2	24.7	44.7
Oregon	79.9	79.7	77.5	81.0	82.3
Pennsylvania	72.7	72.6	74.9	69.8	71.5
Rhode Island	60.6	65.1	62.5	-	54.4
South Carolina	62.2	59.3	66.3	-	61.1
South Dakota	38.7	34.0	49.5	28.1	43.8
Tennessee	60.9	55.3	64.8	62.7	66.5
Texas	32.0	28.8	30.9	32.1	37.2
Utah	45.0	36.8	44.9	53.8	52.8
Vermont	61.4	55.0	71.0	56.0	66.5
Virginia	61.7	54.9	60.0	72.6	71.4
Washington	73.7	71.5	78.0	71.7	72.9
West Virginia	56.2	46.4	56.1	-	71.1
Wisconsin	55.0	52.9	52.6	51.9	62.0
Wyoming	55.0	55.2	55.2	52.9	56.6

Source: Authors' analysis of National Teacher and Principal Survey, 2020-21. Note. Some estimates are not presented due to relative standard errors of 30% or more. Primary schools include at least one grade lower than 5 and none higher than 8. Middle schools include no grade lower than 5 and none higher than 8. High schools include no grade lower than 7 and at least one grade higher than 8. Combined schools include configurations such as K–8, 6–12, or K–12, or any arrangement that spans non-contiguous traditional levels or includes only ungraded classes.

the country and the Midwest, though in states such as South Dakota, Michigan, and Ohio, middle school teachers surpass high school teachers in master's degree attainment. Notably, Minnesota demonstrates relatively little variation across primary (70%), middle (68%), and high school levels (71%), though it has a lower percentage of master's degree holders in combined schools (48%). Overall, five states in the Midwest surpassed the national master's degree attainment levels across primary, middle, and high schools: Minnesota, Ohio, Illinois, Michigan, and Missouri.

Intrastate Variation in Master's Degree Attainment

Master's degree attainment among teachers varies by both the urbanization level of schools and the demographic characteristics of the student population served, such as socioeconomic status (SES). These factors contribute to disparities in the qualifications of the teaching workforce within states, with urban, suburban, and wealthier schools often showing higher levels of master's degree attainment. Such variation across geographic and socioeconomic contexts may affect the consistency of instructional quality and student learning opportunities, particularly if master's-level attainment improves instructional quality.

School Urbanization

Table 3 shows the percentage of teachers holding a master's degree in schools located in cities, suburbs, towns, and rural areas.[7] Nationally, teachers in suburban schools report the highest master's degree attainment rate (65%), followed by those in cities (61%), towns (54%), and rural areas (54%). Table 3 also shows the city-rural and suburban-rural master's degree attainment gaps. The gap in the master's degree attainment rate between city and rural

TABLE 3. Percentage of Public School Teachers Holding a Master's Degree by School Urbanization, 2020-21

	Total	City	Suburb	Town	Rural	City-Rural Gap	Suburban Rural Gap
U.S.	60.1	60.9	64.7	54.0	54.0	6.9	10.7
Alabama	65.0	67.6	68.3	63.6	61.9	5.7	6.3
Alaska	61.3	61.6	59.2	60.2	62.4	-0.7	-3.1
Arizona	52.9	53.6	56.7	53.3	43.2	10.4	13.6
Arkansas	56.0	57.0	47.7	56.0	58.3	-1.2	-10.6
California	58.2	56.5	64.4	40.8	48.3	8.3	16.2
Colorado	63.1	62.9	69.5	53.3	60.0	3.0	9.6
Connecticut	90.3	87.4	92.6	N/A	89.9	-2.5	2.7
Delaware	71.6	66.5	72.5	75.4	70.5	-3.9	2.0
Dist. of Col.	70.4	70.4	-	-	-	-	-
Florida	44.2	42.5	46.3	43.3	38.0	4.5	8.3
Georgia	71.4	73.4	71.2	79.6	67.7	5.7	3.5
Hawaii	49.8	50.8	49.3	46.3	57.9	-7.0	-8.6
Idaho	41.8	52.1	45.4	31.8	38.0	14.1	7.4
Illinois	70.0	77.3	74.8	59.5	47.0	30.3	27.8
Indiana	49.7	55.7	47.7	44.9	47.8	7.9	-0.2
Iowa	45.3	59.8	52.9	41.0	33.8	26.1	19.1

[7] The CCD Elementary/Secondary Locale Code includes four main categories: City, for schools in large or mid-size urban areas; Suburb, for schools in suburban regions near urban centers; Town, for schools in smaller municipalities outside suburban areas; and Rural, for schools in remote areas far from urban centers.

	Total	City	Suburb	Town	Rural	City-Rural Gap	Suburban Rural Gap
Kansas	58.7	66.7	81.2	51.0	47.9	18.8	33.3
Kentucky	83.4	74.4	78.9	84.1	87.9	-13.5	-9.0
Louisiana	37.6	47.9	39.6	20.6	32.6	15.2	6.9
Maine	51.7	62.1	54.9	52.6	46.8	15.3	8.1
Maryland	72.0	85.3	69.4	100.0	67.7	17.7	1.8
Massachusetts	85.6	84.6	86.4	-	80.5	4.2	6.0
Michigan	69.3	74.2	74.7	61.1	58.1	16.1	16.7
Minnesota	66.4	72.7	74.3	60.3	55.0	17.8	19.3
Mississippi	54.8	58.2	57.4	55.6	52.4	5.8	4.9
Missouri	65.7	71.3	70.8	61.3	59.0	12.3	11.8
Montana	50.9	70.2	-	53.4	39.9	30.4	-
Nebraska	63.5	57.2	68.4	64.6	65.4	-8.2	3.0
Nevada	65.7	67.4	66.8	53.0	61.9	5.5	4.8
New Hampshire	64.5	64.8	70.7	59.3	61.7	3.2	9.0
New Jersey	55.8	51.4	56.2	-	57.0	-5.6	-0.8
New Mexico	56.8	51.6	57.0	58.5	60.6	-9.0	-3.6
New York	95.2	93.2	97.5	95.2	95.8	-2.6	1.7
North Carolina	41.4	50.7	38.8	45.8	35.2	15.5	3.6
North Dakota	47.5	61.6	48.8	43.1	35.7	25.9	13.1
Ohio	71.4	57.7	75.8	66.5	76.8	-19.1	-1.0
Oklahoma	31.0	38.0	36.4	33.2	21.4	16.6	14.9
Oregon	79.9	82.4	83.4	70.4	81.0	1.5	2.4
Pennsylvania	72.7	73.8	74.7	64.8	70.4	3.4	4.3
Rhode Island	60.6	59.8	61.9	-	56.4	3.4	5.5
South Carolina	62.2	59.8	66.5	52.9	63.0	-3.3	3.5
South Dakota	38.7	57.6	N/A	46.6	26.8	30.8	-
Tennessee	60.9	58.5	61.5	64.2	61.7	-3.2	-0.3
Texas	32.0	37.1	29.7	26.0	28.7	8.4	1.0
Utah	45.0	46.7	46.4	37.0	41.4	5.3	5.0
Vermont	61.4	-	65.9	61.6	57.1	-	8.8
Virginia	61.7	64.2	68.8	48.9	52.5	11.7	16.3
Washington	73.7	66.4	75.9	73.3	77.9	-11.5	-2.0
West Virginia	56.2	57.1	49.2	60.7	57.1	0.0	-7.9
Wisconsin	55.0	54.6	65.3	58.9	41.8	12.8	23.6
Wyoming	55.0	67.9	-	54.4	50.2	17.7	-

Source: Authors' analysis of National Teacher and Principal Survey, 2020-21. Note. Some estimates are not presented due to relative standard errors of 30% or more.

schools is 7 percentage points, while the gap between suburban and rural schools is 11 percentage points.

In the Midwest, most states also show relatively higher master's degree attainment levels in city and suburban schools than in town and rural schools. Moreover, most Midwest states have city-rural gaps above the national level, ranging from 8 percentage points in Indiana to 31 percentage points in South Dakota, as well as wider suburban-rural gaps, ranging from 12 percentage points in Missouri to 33 percentage points in Kansas. However, Ohio and Nebraska are exceptions, where master's degree attainment is higher in rural areas than in cities (Nebraska, Ohio) and suburbs (Ohio).

Student Socioeconomic Status

The rate of master's degree attainment varies by the proportion of lower-income students served by the school. A common proxy for measuring family income differences across schools is the percentage of students who qualify for free or reduced-price lunch under the National School Lunch Program (NSLP).[8] **Table 4** shows that higher percentages of teachers have master's degrees at schools that have fewer students qualifying for free and reduced-price lunch,

TABLE 4. Percentage of Public School Teachers Holding a Master's Degree by School Urbanization, 2020-21

		PERCENTAGE OF FREE/REDUCED-PRICE LUNCH STUDENTS				
	Total	Less than 37%	38% to 57%	58% to 78%	79% or Higher	Gap Between Lowest & Hightest
U.S.	60.1	65.4	59.9	56.1	56.9	8.4
Alabama	65.0	73.1	69.8	61.4	60.6	12.5
Alaska	61.3	67.9	60.3	-	58.1	9.8
Arizona	52.9	55.9	52.7	55.7	47.9	8.0
Arkansas	56.0	56.7	59.0	55.5	54.4	2.3
California	58.2	60.4	52.2	58.7	58.6	1.8
Colorado	63.1	68.6	65.1	52.2	56.9	11.8
Connecticut	90.3	93.5	89.2	91.8	85.0	8.5
Delaware	71.6	76.7	73.5	-	67.3	9.3
Dist. of Col.	70.4	-	81.7	66.9	71.6	-
Florida	44.2	50.7	43.4	43.8	39.8	10.8
Georgia	71.4	70.8	74.0	67.6	72.7	-1.9
Hawaii	49.8	51.7	49.7	48.9	48.2	3.5
Idaho	41.8	47.4	36.1	55.9	-	24.6
Illinois	70.0	73.4	70.2	61.9	68.9	4.5
Indiana	49.7	55.1	51.2	43.8	46.4	8.6
Iowa	45.3	41.4	49.8	45.3	47.0	-5.6
Kansas	58.7	69.8	54.1	48.2	60.1	9.7
Kentucky	83.4	92.8	84.0	80.1	82.1	10.7
Louisiana	37.6	45.0	33.3	38.3	35.5	9.5
Maine	51.7	60.2	46.5	47.5	49.9	10.3

[8] To qualify, students must meet specific income thresholds based on federal poverty guidelines. Family income at or below 130% of the federal poverty level qualifies students for free lunch, and family income between 130 and 185% of the federal poverty level qualifies students for reduced-price lunch.

		PERCENTAGE OF FREE/REDUCED-PRICE LUNCH STUDENTS				
	Total	Less than 37%	38% to 57%	58% to 78%	79% or Higher	Gap Between Lowest & Hightest
Maryland	72.0	73.8	68.8	72.3	72.4	1.3
Massachusetts	85.6	89.6	78.0	93.7	81.7	7.9
Michigan	69.3	80.4	71.3	58.1	65.1	15.4
Minnesota	66.4	68.3	70.9	66.8	57.4	10.9s
Mississippi	54.8	-	64.4	57.0	52.5	-
Missouri	65.7	70.6	62.6	66.6	56.6	13.9
Montana	50.9	52.8	44.1	-	59.5	-6.7
Nebraska	63.5	64.4	58.9	67.2	63.8	0.6
Nevada	65.7	67.1	62.4	66.7	66.3	0.9
New Hampshire	64.5	69.7	59.7	55.4	-	-
New Jersey	55.8	58.4	50.0	47.3	60.5	-2.1
New Mexico	56.8	54.8	57.7	55.1	56.7	-1.9
New York	95.2	97.4	95.5	93.5	94.2	3.2
North Carolina	41.4	43.0	49.1	46.0	37.0	5.9
North Dakota	47.5	49.8	44.2	-	47.4	2.4
Ohio	71.4	75.4	72.2	67.3	63.5	11.9
Oklahoma	31.0	30.6	30.5	30.4	30.8	-0.3
Oregon	79.9	84.5	82.0	78.5	76.9	7.6
Pennsylvania	72.7	79.0	68.5	72.0	69.5	9.6
Rhode Island	60.6	59.6	46.0	63.6	66.8	-7.1
South Carolina	62.2	70.1	65.5	58.1	59.4	10.7
South Dakota	38.7	37.6	39.0	-	33.5	4.1
Tennessee	60.9	63.2	56.6	62.2	60.4	2.8
Texas	32.0	33.0	29.9	33.4	31.4	1.7
Utah	45.0	43.8	41.9	55.9	41.6	2.1
Vermont	61.4	68.2	52.9	60.9	58.5	9.7
Virginia	61.7	62.5	64.6	56.2	58.7	3.8
Washington	73.7	73.2	81.9	69.3	66.3	6.9
West Virginia	56.2	76.4	61.6	53.7	51.3	25.1
Wisconsin	55.0	54.7	53.6	56.8	50.4	4.3
Wyoming	55.0	56.2	47.2	78.3	-	-

Source: Authors' analysis of National Teacher and Principal Survey, 2020-21.

Note. School SES is defined by the percentage of enrolled students approved for the NSLP based on quartiles (Lowest: 0 <= X <= 37.12; Q2: 37.13 <= X <= 57.89; Q3: 57.9 <= X <= 78.66; Highest: 78.67 <= X <= 100). Some estimates are not presented due to relative standard errors of 30% or more.

compared to schools serving larger proportions of low-income students.[9] Nationally, 65% of teachers hold master's degrees at schools where less than 37% of students qualify for NSLP, compared to 57% at schools where 80% or more qualify, reflecting a gap of eight percentage points.

In the Midwest, this pattern largely persists, though in some states the master's degree attainment rate is higher than the national level at schools with the highest proportion of low-income students: Illinois (69%), Michigan (65%), Nebraska (64%), Ohio (64%), and Kansas (60%). Moreover, contrary to the national trend, the master's degree attainment rate is higher in schools with the highest proportion of low-income students in Iowa, relative to schools with the lowest proportion.

Major of the Master's Degree

Teachers pursue master's degrees across a wide range of fields, including general education; special education; English and language arts; science, technology, engineering, and mathematics (STEM); arts, humanities, and social sciences; technical education; administration and support; and other areas. However, some majors may be more directly relevant to classroom instruction than others. A master's degree in educational administration, for example, can help teachers advance into principal or superintendent roles, whereas majors in curricular subjects or general education typically aim to improve content knowledge and pedagogical skills. (The Addendum provides a detailed categorization of majors used in this analysis.)

Distribution of Majors

As seen in **Table 5**, the vast majority of master's degrees held by teachers across the U.S. are in educational fields related to curriculum rather than administration.[10] Nationally, only 12% of teachers' master's degrees are in administration or support areas such as educational administration, policy studies, counseling and guidance, school psychology, and library or information science. Within the Midwest, nine states have relatively high concentrations of teachers with administration and support majors, ranging from 15% in Michigan to 21% in Missouri. In contrast, Minnesota (6%), Wisconsin (11%), and Indiana (11%) fall below the national average for administration/support degrees, though the lowest level nationally is in New York (2%).

Among curriculum-focused majors, nationally, 38% of teachers with master's degrees have a major in general education fields such as secondary education, followed by English and language arts (14%), special education (13%), arts, humanities, and social sciences (9%), STEM fields (5%), and technical education (5%). In some Midwest states, however, the trend diverges from the national pattern. For example, Missouri (41%),

TABLE 5. Percentage Distribution of Master's Degree Majors among Public School Teachers, 2020-21

	General Education Fields	Special Education	English & Language Arts	STEM	Arts, Humanities, & Social Sciences	Technical Education	Admin/ Support	Other
U.S.	38.3	13.2	14.1	4.8	8.6	5.1	12.4	3.4
Alabama	46.6	13.8	6.2	3.2	-	5.9	13.6	-
Alaska	43.7	14.7	14.5	5.5	6.0	-	6.7	-
Arizona	41.0	8.6	15.0	3.9	8.8	3.4	17.2	-
Arkansas	38.0	13.6	9.7	-	5.2	8.2	17.4	-
California	41.6	11.9	9.5	4.8	10.3	4.7	14.3	2.9
Colorado	34.5	13.1	15.6	8.8	11.7	4.0	8.5	3.8
Connecticut	45.6	13.0	12.4	6.6	10.7	4.5	2.3	4.7
Delaware	34.3	18.9	10.9	-	4.2	8.6	18.1	-

[9] It is unclear whether this pattern is due to teachers sorting across districts or schools within districts.

[10] Among teachers with two or more master's degrees (7% of all teachers with a master's degree), only the major of the first master's degree is classified in this analysis. This results in a slightly more conservative estimate of the percentage of teachers with curriculum-oriented master's degrees, as 4.5% of teachers with an administration/support major in their fist master's degree obtained a second master's degree in a curriculum-oriented field.

	General Education Fields	Special Education	English & Language Arts	STEM	Arts, Humanities, & Social Sciences	Technical Education	Admin/ Support	Other
Dist. of Col.	43.4	14.8	12.3	-	11.1	5.8	7.3	-
Florida	23.7	10.3	19.2	6.3	11.4	6.5	18.5	4.1
Georgia	47.8	13.3	9.8	4.0	8.7	6.0	7.6	2.9
Hawaii	51.9	10.8	5.9	4.5	7.8	-	10.9	-
Idaho	26.5	8.3	11.4	8.5	13.4	8.8	17.8	5.3
Illinois	36.9	9.0	18.6	4.1	7.7	3.4	17.4	2.9
Indiana	43.6	14.3	7.9	4.7	7.5	4.8	11.1	6.1
Iowa	39.2	16.5	8.8	-	11.7	-	11.7	6.2
Kansas	35.7	13.4	13.5	-	7.3	4.8	16.9	-
Kentucky	47.8	12.2	10.9	-	6.0	-	16.5	-
Louisiana	31.0	13.1	9.2	-	8.7	7.4	24.5	-
Maine	41.5	12.8	17.1	-	8.1	4.0	8.9	-
Maryland	38.8	11.5	14.9	6.9	7.2	5.0	13.2	-
Massachusetts	44.4	18.2	13.2	5.1	10.4	3.6	3.5	-
Michigan	37.5	12.2	16.0	4.2	7.1	5.7	14.8	2.5
Minnesota	53.2	14.9	10.8	2.7	6.7	-	5.9	4.5
Mississippi	47.3	10.5	6.6	6.2	6.9	7.4	11.5	-
Missouri	40.9	8.3	10.6	4.3	7.8	3.6	20.9	3.4
Montana	33.4	10.0	15.6	9.0	7.4	9.7	10.2	-
Nebraska	33.0	9.1	17.7	-	7.0	8.3	16.0	-
Nevada	43.1	15.8	11.4	5.2	4.5	5.0	11.4	3.6
New Hampshire	42.5	14.1	12.4	5.4	12.7	4.5	6.4	-
New Jersey	28.5	18.3	16.8	5.1	9.9	5.0	14.8	-
New Mexico	30.9	15.8	22.5	5.6	8.3	5.8	9.6	-
New York	35.1	20.0	22.6	4.6	9.4	2.4	1.7	4.1
North Carolina	38.2	12.0	13.6	5.7	8.6	6.3	13.0	-
North Dakota	29.5	22.9	10.2	-	7.0	-	18.2	-
Ohio	35.9	14.7	14.8	5.8	6.6	5.2	14.7	2.2
Oklahoma	-	-	16.8	-	-	-	31.0	-
Oregon	62.5	9.9	8.2	4.1	5.7	-	4.9	2.9
Pennsylvania	39.0	13.5	16.6	5.1	6.2	7.9	7.7	4.0
Rhode Island	27.1	22.5	23.3	-	9.7	-	6.9	-
South Carolina	45.7	8.1	12.2	-	7.6	6.6	13.4	4.9
South Dakota	33.2	6.8	17.6	-	6.1	9.9	17.5	-
Tennessee	47.6	7.9	13.6	-	4.5	3.3	17.3	-
Texas	21.1	8.3	9.4	6.2	12.8	9.7	27.5	4.9
Utah	39.5	13.1	8.9	7.9	7.4	7.6	12.0	-
Vermont	34.0	21.3	12.0	7.3	8.2	-	11.4	-
Virginia	38.0	16.0	14.4	4.7	9.9	4.6	9.6	-
Washington	50.6	8.0	10.8	4.4	7.9	4.7	12.4	-
West Virginia	27.3	23.0	22.8	-	-	5.9	8.9	-
Wisconsin	35.4	11.8	15.1	4.7	7.1	7.4	11.4	7.0
Wyoming	30.2	14.5	14.4	8.6	11.1	7.4	10.7	-

Source: Authors' analysis of the National Teacher and Principal Survey, 2020-21. Note. Some estimates are not presented due to relative standard errors of 30% or more. The Other category includes health education, physical education, and other fields not specified.

Indiana (44%), and Minnesota (53%) show a greater emphasis on general education majors over subject-focused degrees.

It can also be informative to examine whether teachers obtained their master's degrees from a college of education or a disciplinary department. This distinction may have implications for instructional effectiveness, teacher retention, and career pathways, including opportunities outside of the teaching profession. The vast majority of teachers' master's degrees in general education (93%), special education (94%), administration/support (88%), other fields (80%), and English and language arts (78%) were obtained from colleges of education. In contrast, a smaller proportion of degrees in STEM (65%), technical education (59%), and arts, humanities, and social sciences (52%) were awarded by education colleges.

Major-Subject Congruence

Table 6 presents the distribution of master's degree majors among teachers whose main assignment is at the primary, middle, or combined school level. Among teachers primarily responsible for general instruction of pre-K through middle school students, 49% hold a master's degree in the corresponding area (pre-K through middle general education), followed by 17% in English and language arts, compared to 11% who majored in administration/support. Over two-thirds of special education teachers hold a master's degree specifically in either special education (56%) or English and language arts (15%). For English and language arts teachers, 40% hold a master's degree in the corresponding field, with an additional 22% holding degrees in pre-K through middle general education. Teachers with a major in administration/support are most commonly found among those teaching social sciences (22%), technical education (26%), and other courses (35%).

At the high school level (see **Table 7**), across teaching assignment fields, teachers with master's degrees have tended to major in either secondary grades general education or the field that is directly congruent with the subject matter taught. Nonetheless, administration and support fields, although representing only 14% of majors, frequently rank as the third most common major across teaching areas. Moreover, direct major-subject congruence varies across teaching assignment fields, including special education (62%), English and language arts (38%), arts and humanities (37%), mathematics (25%), science and engineering (29%), social sciences (15%), technical education (38%), and health/physical education (36%). For high school teachers teaching English and language arts, for example, 38% hold a master's degree in the corresponding field, followed by 26% in secondary grades education and 13% in administration/support. Teachers with a major in administration/support at the high school level are most commonly found among those teaching social sciences (18%), technical education (19%), health and physical education (27%), and other courses (31%).

A calculation of precise rates of major-subject congruence would require additional data not yet available, as general education majors can include subject-specific tracks. However, a conservative approach would assume that general education majors have subject tracks relevant to the teacher's principal teaching assignment. Accordingly, **Table 8** shows that among teachers with a primary teaching assignment in general (multi-subject) early childhood or pre-K, elementary grades, or middle grades, about 49% had a master's degree major in a corresponding general education area. Among primary, middle, and combined school teachers with a primary teaching assignment in mathematics, about 36% have a major in mathematics or pre-K through middle general education. Other rates of major-subject congruence for primary, middle, and combined teachers varied: special education (56%); English and language arts (61%); arts and humanities (55%); science and engineering (38%); social sciences (28%); technical education (39%); and physical education (51%). Among high school teachers, rates of major-subject congruence are estimated as follows: special education (61%); English and language arts (65%); arts and humanities (59%); mathematics (54%); science and engineering (65%); social sciences (47%); technical education (54%); and physical education (48%).

TABLE 6. National Percentage of Primary, Middle, and Combined Public School Teachers with a Master's Degree Major in a Particular Teaching Assignment Field, 2020-21

Main Teaching Assignment Field	Pre-K through Middle General	Secondary Frades	Other General	Special Education	English & Language Arts	Arts & Humanities	Mathematics	Science & Engineering	Social Sciences	Technical Education	Health/ Physical Ed	Admin/ Support	Other
Total	29.7	4.5	6.4	13.9	15.8	5.9	1.4	1.7	1.2	4.1	2.0	12.0	1.4
Pre-K through Middle General	49.1	0.8	5.5	6.2	16.6	1.9	1.0	1.1	1.0	3.6	0.3	11.2	1.7
Special Education	9.8	1.2	4.0	55.6	14.8	0.9	-	-	1.2	2.2	0.9	7.8	0.7
English & Language Arts	21.5	6.6	7.4	5.5	39.9	2.4	-	-	0.8	2.8	-	10.9	1.4
Arts & Humanities	8.9	9.4	8.9	3.1	4.2	46.5	-	-	1.4	3.5	-	11.9	-
Mathematics	20.0	15.7	10.1	5.6	4.9	1.5	15.9	2.3	-	7.5	-	13.3	-
Science & Engineering	20.2	18.4	6.7	3.3	3.3	1.7	-	18.0	-	7.1	-	16.2	1.9
Social Sciences	18.9	16.5	7.8	5.1	6.1	7.1	-	-	9.4	4.5	-	21.8	-
Technical Education	8.5	9.6	6.8	-	-	-	-	-	-	30.1	-	25.7	-
Health/ Physical Ed	11.0	4.1	10.8	3.2	-	4.2	-	-	-	-	40.3	18.6	-
Other	19.8	-	-	-	12.2	-	-	-	-	-	-	34.5	-

Source: Authors' analysis of the National Teacher and Principal Survey, 2020-21. Note. Some estimates are not presented due to relative standard errors of 30% or more. The Other category includes library or information science and other fields not specified.

TABLE 7. National Percentage of Public High School Teachers with a Master's Degree Major in a Particular Teaching Assignment Field, 2020-21

Main Teaching Assignment Field	Pre-K through Middle General	Secondary Frades	Other General	Special Education	English & Language Arts	Arts & Humanities	Mathematics	Science & Engineering	Social Sciences	Technical Education	Health/ Physical Ed	Admin/ Support	Other
Total	2.1	23.0	7.4	11.5	10.1	10.0	3.8	5.4	2.3	7.4	2.5	13.5	1.0
Pre-K through Middle General	2.0	4.7	6.1	61.5	5.6	1.9	-	-	-	3.0	-	11.9	-
Special Education	2.6	26.2	5.5	4.3	38.4	4.9	-	-	-	2.6	-	12.5	-
English & Language Arts	2.4	21.8	8.1	3.1	5.4	37.3	-	-	3.9	3.7	1.4	11.3	-
Arts & Humanities	1.5	29.3	10.0	4.0	1.5	1.7	24.9	3.5	-	6.7	1.3	13.5	1.1
Mathematics	1.9	35.9	7.1	1.6	1.7	-	1.7	29.1	-	6.7	1.3	9.9	1.0
Science & Engineering	-	32.8	7.4	4.9	3.8	11.8	-	-	14.6	3.1	-	17.8	-
Social Sciences	3.0	15.8	8.4	3.3	2.0	2.5	-	2.9	-	38.0	1.8	19.1	-
Technical Education	-	12.8	6.6	-	-	6.3	-	-	-	-	35.5	26.5	-
Health/ Physical Ed	-	-	-	22.2	-	-	-	-	-	-	-	31.2	-
Other	19.8	-	-	-	12.2	-	-	-	-	-	-	34.5	-

Source: Authors' analysis of the National Teacher and Principal Survey, 2020-21. Note. Some estimates are not presented due to relative standard errors of 30% or more. The Other category includes library or information science and other fields not specified.

TABLE 8. National Percentage of Public School Teachers with an In-Area Master's Degree by Primary Teaching Assignment and School Level

Primary Teaching Assignment	Primary, Middle, & Combined Schools	High Schools
Pre-k through Middle General	49	–
Special Education	56	61
English & Language Arts	61	65
Arts & Humanities	55	59
Mathematics	36	54
Science & Engineering	38	65
Social Sciences	28	47
Technical Education	39	54
Physical Education	51	48

Source: Authors' analysis of National Teacher and Principal Survey, 2020-21.

Student Outcomes Research

This review draws upon human capital theory (Becker, 1964) as a conceptual foundation for examining the relationship between graduate teacher education and student outcomes. Human capital theory posits that investments in education enhance an individual's knowledge, skills, and competencies, thereby improving productivity and effectiveness in professional roles such as teaching. From this perspective, graduate education is expected to provide teachers with more advanced pedagogical techniques, deeper subject-matter expertise, and stronger professional dispositions conducive to effective teaching than undergraduate preparation alone (Goldhaber, 2015). A central implication of human capital theory is that the benefits of education depend not only on its level but also on its relevance to job demands. Accordingly, the value of a graduate degree may vary based on such factors as the alignment between a teacher's graduate training and their instructional responsibilities (Bastian, 2018; Chang et al., 2020; Hill, 2007) as well as the developmental and academic needs of students across subjects and grade levels (Goldhaber, 2015; Wayne & Youngs, 2003).

Researchers have explored the impact of teacher educational attainment on student achievement at all levels of P-12 education, including early childhood, elementary, middle, and high schools. The majority of the studies have focused on reading and math, with more recent analyses extending an inquiry into various fields, such as science, social studies, and English language arts, as well as specific courses within these fields, including algebra, geometry, biology, chemistry, physical science, and civics (Bastian, 2018; Ladd & Sorensen, 2015).[11] However, analytic approaches vary considerably. For example, some studies compare student outcomes for teachers with a graduate degree to those with only a bachelor's degree, whereas others model whether individual teachers become more effective after earning a graduate degree. The former captures a total credential effect reflecting any combination of graduate education and advantageous traits of teachers who chose to pursue the degree, while the latter seeks to isolate the effect of graduate education from teacher self-selection effects. In addition, studies vary in their unit of analysis (e.g., student, school, district), geographic scope (e.g., single state vs. national), and scope of graduate de-

[11] Studies in this review were selected if they employed regression analyses that control for multiple confounding variables or quasi-experimental designs that permit stronger causal inferences about the effect of holding a graduate degree on student outcomes. Studies frequently utilized a value-added approach and modeled gains in test scores as a function of a rich set of school, family, student, classroom, and teacher characteristics that consisted of both time-invariant and time-varying variables.

gree attainment (e.g., master's degree, any graduate degree). These methodological variations complicate interpretations, affect generalizability, and contribute to mixed findings in the literature.

This synthesis examines the evidence on the impact of graduate degrees, most commonly master's degrees, in three main areas. First, it explores the overall average effects of graduate degree attainment on student outcomes across early childhood, elementary, middle, and high schools without accounting for major-subject congruence. It highlights the methodological challenges and variations in findings, such as differences across school levels, subject areas, and research designs. Second, it examines the importance of major-subject congruence, focusing on how alignment between a teacher's degree specialization and their instructional field can enhance student success. Third, it considers the impact of teacher educational attainment on academic engagement and postsecondary outcomes.[12]

Average Effect on Student Achievement

Researchers have examined the average effect of teachers having a graduate degree on student test performance in early childhood and elementary schools, middle schools, and high schools. Although studies in this section utilize rigorous statistical modeling, they often treat graduate degree attainment as a monolithic construct, which does not account for potential variations in teacher effectiveness arising from differences in graduate degree major. While some studies suggest positive associations under certain conditions, others show no significant effects or even negative impacts. These divergent outcomes underscore the complexity of this relationship and the need to consider contextual and methodological nuances in evaluating the role of teacher graduate education in influencing student success.

Early Childhood and Elementary Schools

In early childhood and elementary schools (pre-kindergarten through grade 5), teachers with a master's degree relative to only a bachelor's degree have not had a greater impact on student reading achievement in the majority of studies (Bastian, 2018; Betts et al., 2003; Buddin & Zamarro, 2009; Collier, 2013; Croninger et al., 2007; Dee, 2004; Harris & Sass, 2011; Henry et al., 2014; Jepsen, 2005; Rivkin et al., 2005; cf. Curry et al., 2018). However, studies examining the effect of teacher educational attainment on student math achievement in K–5 schools have yielded mixed results. Four studies found that the math achievement scores of students whose teachers had a master's degree were significantly higher than those of students whose teachers did not obtain a master's degree (Betts et al., 2003; Dee, 2004; Collier, 2013; Ferguson & Ladd, 1996). On the contrary, seven studies failed to detect a significant relationship between students' math achievement and their teachers' educational attainment level (Bastian, 2018; Buddin & Zamarro, 2009; Croninger et al., 2007; Harris & Sass, 2011; Henry et al., 2014; Jepsen, 2005; Rivkin et al., 2005).

Middle Schools

Similar to the findings in early childhood and elementary schools, teacher educational attainment has generally not been positively associated with the reading achievement scores of sixth- through eighth-grade students (Bastian, 2018; Betts et al., 2003; Chingos & Peterson, 2011; Henry et al., 2014; Ladd & Sorensen, 2015; Bhai & Horoi, 2019). In contrast, there is some evidence of a positive effect for student math achievement. Early studies found a mix of nonsignificant (Betts et al., 2003; Hanushek et al., 2005; Chingos & Peterson, 2011; Bastian, 2018), positive (Harris & Sass, 2011), and even negative (Henry et al., 2014) effects on math achievement. However, a more recent study by Bhai and Horoi (2019) employed a highly rigorous design and shifted the weight of evidence in favor of a positive effect. Specifically, Bhai and Horoi applied a twin-by-year fixed effects research design to estimate classroom effects, such as teacher graduate degrees, on student achievement in North Carolina. By focusing on twins, whose shared genetics and family environments minimize biases from unobserved ability differences, the study isolated the influence of classroom quality on subject-specific end-of-grade test scores by comparing twins assigned to different classrooms. In addition to the twin-by-year fixed effects models, the researchers specified traditional student and individual fixed effects models based on

[12] While cost and return-on-investment analyses are highly relevant to state and district decision-making, they are beyond the scope of this report.

the entire school population. Bhai and Horoi corroborated earlier findings showing positive effects of teacher graduate degrees on math achievement for middle school students overall as well as no effects on reading achievement.

High Schools

Given a wider range of subjects within the high school (grades 9-12) curriculum compared to the elementary and middle school curricula along with deeper subject-specific knowledge required of teachers, studies comparing the impact of teachers with undergraduate and graduate degrees on student achievement must contend with more complex and nuanced dynamics. In an early analysis, Clotfelter et al. (2010) examined composite scores from End of Grade (EOG) and End of Course (EOC) standardized tests across multiple subjects (English, algebra, geometry, biology, economics, and civics) for middle and high school students in North Carolina. They found no significant differences in the composite scores of students taught by teachers with and without master's degrees. However, interpreting these findings requires caution, as composite score comparisons may mask subject-specific effects and fail to account for variations in curricular content and instructional complexity across grade levels.

Dissimilar to findings for earlier school levels, most studies on student math achievement showed that graduate degrees did not translate into higher student test scores (Bastian, 2018; Betts et al., 2003; Henry et al., 2014; Ladd & Sorensen, 2015; Shuls & Trivitt, 2015). However, findings have been mixed for other subjects. Most researchers have found no evidence that teacher graduate degrees yield increased learning gains in English (Henry et al., 2014; Ladd & Sorensen, 2015; Shuls & Trivitt, 2015; cf. Bastian, 2018), and Bastian's (2018) overall analysis showed negative effects of a graduate degree on high school science and social studies achievement. Similarly, Ladd and Sorensen (2015) concluded that master's degrees – when not controlling for the major field of study – did not impact achievement in U.S. history, civics, and geometry, and even yielded negative effects for biology and algebra.

In contrast, two studies showed positive effects of holding a master's degree, namely Betts et al.'s (2003) finding of improved reading achievement in San Diego and Henry et al.'s (2014) finding of improved science achievement scores in North Carolina. Nonetheless, as discussed below, mixed effects may be partly attributed to a failure to account for the congruence (or lack thereof) between the master's degree major and the teacher's classroom subject matter (Goldhaber & Brewer, 2000; Bastian, 2018).

Cumulative Impact

Recent scholarship has adopted a cumulative perspective that extends beyond single-year investigations of teacher impact by examining whether repeated exposure to high- or low-quality teaching over multiple grades exerts a compounding influence on student outcomes (Lee, 2018; Lee & Choi, 2024). Lee (2018) used data from the Longitudinal Study of American Youth (LSAY) to examine the cumulative impact of teacher quality on 12th grade NAEP math achievement among cohorts of 7th and 10th grade students. Lee's school fixed-effects models indicated that four cumulative teacher quality indices – years of teaching experience, possessing a graduate degree, major/minor-subject congruence, and teacher value-added scores – were positively associated with 12th grade math achievement. Lee and Choi (2024) conducted a similar analysis of teacher value-added scores and demonstrated that the effects of exposure to less effective teachers are not simply additive but may accumulate over time, amplifying educational inequalities.

Major-Subject Congruence and Student Achievement

The impact of teachers' content knowledge on student educational attainment has attracted growing research interest, with effects depending on the grade level and academic subject. Studies vary in how they define major-subject congruence. Generally, if a teacher reports holding a degree in the subject corresponding to their classroom subject matter, the degree is designated as in-area, subject-specific, or content-related (e.g., Bastian, 2018; Chang et al., 2020; Sancassani, 2023). For example, teachers holding a degree in mathematics, English/reading, science, or social studies are in-area if they are teaching courses in high school mathematics, English, science, and social studies, respectively. In contrast, ma-

jor-subject incongruence is denoted by an out-of-area or non-content-related degree.

Elementary School

At the elementary level, Collier (2013) used math and reading test scores from the Early Childhood Longitudinal Study and compared the effect of a graduate degree earned in four major areas: early childhood education, elementary education, other education-related areas, and non-education-related fields. They found that an in-area graduate degree in elementary education was the only one associated with improved student achievement in mathematics for all elementary students (grades 1 through 5). No effects were observed for reading achievement.

Bastian (2018) examined teachers' graduate degrees in eight fields and sought to disentangle the signaling and human capital effects on student test scores in public elementary, middle, and high schools in North Carolina (the results of the middle and high school analyses are described below). The signaling analysis explored whether teachers holding a graduate degree were more effective than those with a baccalaureate degree due to self-selection, graduate education, or some combination. In contrast, the human capital analysis examined whether the process of earning a graduate degree among current teachers led to improvements in their effectiveness, focusing more on the value added by graduate education itself. The fields of graduate degrees included elementary education, special education, reading and English language arts, mathematics, science, social studies, school administration, and other (e.g., counseling, social work, curriculum and instruction, foreign languages, arts, career-technical education). Bastian examined the effects of graduate degrees on student achievement in various school subjects, distinguishing between in-area and out-of-area degrees.[13] Additionally, the study analyzed the impact of graduate degrees in eight specific content areas individually. While the signaling analysis indicated that an in-area graduate degree in elementary education, mathematics, science, or reading had no respective effect on elementary math and fifth grade science as well as a small negative effect on elementary reading, the process of earning an in-area degree did boost teacher value-added scores in fifth-grade science. Conversely, out-of-area degrees were consistently negatively associated with student performance in elementary math, reading, and fifth-grade science in the signaling analysis.

Middle School

At the middle school level, Ladd and Sorensen (2015) analyzed the impact of teachers' subject-specific master's degrees on student outcomes in mathematics and reading comprehension in North Carolina. Their findings indicated no significant difference in student performance, and mathematics teachers with master's degrees in their subject area were less effective than their counterparts without master's degrees. In contrast, Bastian's (2018) analysis indicated that middle school mathematics teachers who earned in-area graduate degrees were more effective than teachers with undergraduate degrees only, and the process of earning an in-area degree boosted teacher value-added scores in middle school mathematics. Similar to Bastian's findings at the elementary level, teachers with out-of-area master's degrees were less effective compared to teachers with undergraduate degrees only in middle school math and reading. While the divergent findings between these studies may seem unexpected, Bastian's study arguably merits greater weight due to its more rigorous design, larger sample size of teachers and students, and use of more recent test score data.

More recently, Sancassani (2023) utilized cross-sectional data from the 2015 Trends in Mathematics and Science Study (TIMSS) to examine the impact of subject-specific teacher qualifications on 8th-grade student test scores in four science subjects: biology, chemistry, physics, and earth science. The study analyzed data from 224,454 students and 11,243 teachers across 30 countries, using a student and teacher fixed effects model. Sancassani provided robust evidence of a positive influence of teacher subject-specific qualifications – defined as holding at least one

[13] According to the author, "in-area classifications are as follows: (1) teachers in elementary mathematics, reading, and science are in-area with a graduate degree in elementary education or a graduate degree in mathematics, English/reading, or science, respectively; (2) teachers in middle grades mathematics, reading, and science are in-area with a graduate degree in mathematics, English/reading, or science, respectively; (3) sixth-grade teachers in mathematics and reading are in-area with a graduate degree in elementary education; and (4) teachers in high school mathematics, English, science, and social studies are in-area with a graduate degree in mathematics, English/reading, science, or social studies, respectively" (p. 659).

major in biology, chemistry, physics, or earth science at either the undergraduate or graduate level[14]– on student achievement in these subjects (increasing test scores by .035 SD). The effect was larger for students with lower socioeconomic backgrounds and increased over time until peaking at 18 years of teaching experience. Although the effect of major-subject congruence among teachers with a master's degree was not directly modeled, an interaction test indicated that teachers with a master's degree were as effective as those without one while accounting for whether they had a subject-specific major at either the undergraduate or graduate level. However, an additional interaction test showed stronger positive effects of subject-specific qualifications for teachers who also held a degree with a major in general education, science education, or math education. Sancassani concluded that "teacher pedagogical knowledge, captured by the major in education, and teacher subject knowledge, captured by the teacher subject-specific qualifications, are complementary ingredients for effective teaching" (p. 7).

High School

Analyzing data from the 1988 National Educational Longitudinal Study, Goldhaber and Brewer (2000) found that high school students taught by teachers holding either a bachelor's degree or a master's degree in mathematics achieved significantly higher math scores than those taught by teachers with degrees in unrelated subjects. However, no effects of major-subject congruence were observed for science achievement scores. Bastian (2018) showed that high school mathematics teachers who earned in-area graduate degrees were more effective than teachers with undergraduate degrees only, though no signaling effects were observed for high school science, English, or social studies. However, the process of earning an in-area degree boosted teacher value-added scores in high school science and social studies. Consistent with elementary and middle school levels, Bastian found that teachers with out-of-area master's degrees were less effective compared to teachers with undergraduate degrees only in high school math and social studies. These negative associations were especially salient for teachers with out-of-area graduate degrees in school administration and other fields, such as counseling, social work, curriculum and instruction, foreign languages, arts, and career-technical education.

On the contrary, Ladd and Sorensen's (2015) study provided mixed evidence of the impact of teacher graduate degrees by field of study on students' achievement in high schools in North Carolina. They used End of Course (EOC) performance data for English, civics, U.S. history, algebra II, geometry, biology, physical science, and chemistry in high schools as measures of student performance. Ladd and Sorensen found that the effects of earning a subject-specific master's degree did not translate into improved student performance for the majority of subjects. Moreover, for physical science teachers in high school, earning a master's degree in science was associated with lower effectiveness in the classroom. In high school civics, however, both in-area social studies degrees and out-of-area school administration degrees had large positive effects on student performance.

Summary of Test Performance Effects

In summary, studies examining the average effect of teacher graduate degree attainment (most commonly master's degrees) on student test performance without modeling major-subject congruence have yielded mixed findings, with results varying by school level, subject area, and methodological design. Research on teachers in early childhood and elementary schools has generally shown limited evidence of an impact on student reading achievement, though some positive results were reported for math achievement. At the middle school level, recent studies suggest a positive effect of graduate degrees on student math achievement, while effects on reading achievement appear less likely. In high schools, the impact of graduate degrees is inconclusive, with little evidence of improved performance in core subjects like math and English, though some studies noted gains in science and reading. Finally, initial research on the cumulative impact of teacher quality from 7th to 12th grade has demonstrated a positive effect on math achievement.

[14] Teachers could report more than one subject-specific qualification. Students in the sample were taught on average by teachers with 1.24 subject-specific qualifications in science.

The relationship between major-subject congruence and teacher effectiveness also varies considerably by educational level and subject area. At the elementary level, findings are mixed, with some evidence suggesting positive or null effects of an in-area graduate degree on math and science achievement, alongside a small negative effect on reading achievement. In middle schools, two out of three studies indicate a positive impact of in-area graduate degrees on math achievement, while most studies show no effect for reading achievement. Major-subject congruence also appears influential for science achievement, but the degree level – undergraduate vs. graduate – of that congruence was not tested. At the high school level, two out of three studies reported positive effects of in-area graduate degrees on math achievement, while one study noted a negative effect for physical science teachers. Additionally, acquiring an in-area graduate degree was associated with positive effects on science and social studies achievement. Across all school levels, with few exceptions, out-of-area graduate degrees were associated with either negative or null effects on student achievement.

Since scholarly efforts to evaluate the associations between graduate education and teacher effectiveness have produced mixed results over the years, additional research is needed to better inform policy implications. For example, apart from the school level, academic subject, and major-subject congruence, the effects of teacher credentials may vary by student subpopulation. Betts et al. (2003) found that a teacher's degree attainment level was associated with substantial growth among English language learners in middle school math and high school reading.

Future moderation analyses could also examine additional teacher attributes and qualifications, such as motives for pursuing a graduate degree and the curricular focus of credentials. Chang et al. (2020) interviewed teachers and school leaders and revealed that teachers who earned a graduate degree solely to increase their salary did not improve student outcomes. Similarly, teachers who pursued graduate degrees in school administration aspiring to administrative careers did not increase their effectiveness. On the contrary, teachers who were motivated to continue teaching students typically obtained graduate degrees in fields aligned with their classroom subject matter and substantially improved student achievement.

To better isolate the relative contributions of subject-matter content knowledge and pedagogical content knowledge, researchers could incorporate richer credential data, such as distinguishing the source of the graduate degree (college of education vs. disciplinary department), examining interactions between undergraduate education-focused majors and graduate content-focused programs, and incorporating direct knowledge assessments. As noted above, initial cross-national evidence in science education indicates synergistic effects when teachers hold both an education-related and a subject-specific credential (Sancassani, 2023). Similarly, in a direct assessment of teacher knowledge in middle school physical science classrooms, Sadler et al. (2013) found that teachers' subject-matter knowledge often predicted higher learning gains, but on items with high misconception rates, significant gains for higher-achieving students occurred only when teachers possessed both subject knowledge and knowledge of common student misconceptions (a form of pedagogical knowledge).

Differences in the quality of teacher preparation programs may also help explain the mixed results in the literature. When examining public universities in Florida, Chingos and Peterson (2011) found little difference in teacher effectiveness based on the selectivity of the institution from which teachers earned their master's degree. In contrast, Ladd and Sorensen (2015) observed a negative association between teachers' completion of their master's program at for-profit institutions and student achievement in middle school mathematics and high school science. Variation in program quality has led some scholars to call for reforms to teacher preparation and accountability systems, including the adoption of standards-based performance assessments, performance-based accreditation, and more consistent and rigorous clinical training opportunities (Darling-Hammond, 2020).

Academic Engagement and Postsecondary Outcomes

While much of the research on teacher educational attainment has focused on student test performance,

some studies have examined its influence on other measures of student success, including academic engagement and postsecondary outcomes. For example, Ladd and Sorensen (2015) found that master's degree attainment was associated with a two-percentage point decrease in high student absenteeism (defined as more than 10 absences in one year), suggesting that teachers with graduate education may foster stronger student engagement.

Studies examining the effect of teacher educational attainment on postsecondary outcomes have employed a cumulative exposure (Lee, 2018; Lee & Lee, 2020) or school-level composite (Graham & Flamini, 2023) analysis. In the former, Lee and Lee (2020) hypothesized that a student's cumulative number of highly qualified teachers would be associated with their likelihood of earning a postsecondary degree. These researchers utilized national survey data from the 30-year Longitudinal Study of American Youth (LSAY), which were collected from students and teachers in U.S. public middle and high schools. Lee and Lee constructed a composite measure representing cumulative graduate degree attainment for mathematics and science teachers, which proved to be an important predictor of student postsecondary outcomes. Specifically, for mathematics teachers, a one standard deviation increase in cumulative graduate degrees was associated with 21% increase in the odds of students completing a postsecondary degree. For science teachers, a one standard deviation increase in their cumulative graduate degrees increased their students' odds of attaining a postsecondary credential by 21%. Notably, these effects became insignificant when controlling for cumulative major/minor-subject congruence and cumulative years of teacher experience. Although major/minor-subject congruence was associated with a 22% to 30% increase in the odds of attaining a postsecondary credential, the degree level of congruence was not modeled.

Graham and Flamini (2023) analyzed teacher quality in high schools in Georgia using a school-level composite measure that included teacher degree attainment and years of experience. They explored the impact of teacher quality on school-level rates of college enrollment within 16 months of high school graduation and completion of at least one year of credits within the first two years of enrollment. Graham and Flamini's analysis employed a school and year fixed effects design, which indicated a positive association between teacher quality and college enrollment as well as persistence in college. Specifically, they found that a one standard deviation increase in teacher quality was associated with a two-percentage point increase in the share of high school graduates who enrolled in college, with stronger effects for economically disadvantaged students (seven percentage points) and Black students (three percentage points). Schools that improved teacher quality by one standard deviation experienced, on average, a six-percentage point increase in their rate of college student persistence. However, since the contribution of graduate degree attainment was not modeled separately, years of experience may have confounded the observed effects.

Teacher Outcomes

Beyond the impact of graduate education on student outcomes, a number of studies have examined its potential influence on teacher outcomes, including evaluation ratings, perceived self-efficacy, and retention. Teacher evaluation ratings – typically based on peer classroom observations or principal evaluations using structured rubrics – offer a complementary lens on instructional quality that may capture competencies not fully reflected in standardized test outcomes (Goldring et al., 2015). Insofar as the evaluation criteria are aligned with competencies developed through graduate education, teachers with a graduate degree may receive more favorable evaluations. For example, Bastian (2018) examined principal evaluations of North Carolina public school teachers across five domains: leadership, classroom environment, content knowledge, facilitating student learning, and reflecting on practice. Teachers with in-area graduate degrees received higher ratings than those with only a bachelor's degree, and longitudinally, teachers' ratings in the leadership domain improved after earning an in-area graduate degree (e.g., being a positive change agent in the school and profession). In contrast, out-of-area degrees were largely unassociated with ratings, except for a positive effect in the classroom environment category.

Emerging evidence from teacher self-reported survey and interview data suggests that graduate education may help teachers increase their self-efficacy and create a positive academic environment (Chang et al., 2020; Reeves et al. 2022; Shoulders & Krei, 2015). For example, Shoulders and Krei (2015) found that teachers with graduate degrees reported higher self-efficacy in instructional practices and classroom management compared to teachers with only a bachelor's degree. Reves et al. (2022) also confirmed that teachers with master's degrees reported higher self-efficacy, though there was no impact on teacher job satisfaction. In Chang et al.'s (2020) qualitative analysis, teachers with graduate degrees reported improved classroom effectiveness, served as mentors, supported the professional development of their colleagues, promoted research-based practices in teaching, and created a positive and supportive classroom culture. As one participant remarked, "What I learned in that program…I put it to use immediately in my classroom. You know, it revolutionized my practice…it has caused me to think differently about why I do what I do" (p. 77).

Regarding teacher retention, whereas some researchers have shown that teachers with higher levels of education are more likely to leave their position, school, or profession (Borman & Dowling, 2008; Grissom & Bartanen, 2019; Taie & Lewis, 2023), others have reported findings to the contrary (Hughes, 2012; Nguyen et al., 2020; Perrachione et al., 2008). Notably, Nguyen et al.'s (2020) meta-analysis indicated that teachers with graduate degrees were equally likely to remain in teaching as those with only a bachelor's degree. Additional research is needed to determine whether retention patterns vary by such factors as the availability of school resources for master's-level compensation, the teacher's graduate major, or the type of graduate program attended. For example, Nguyen et al. found that teachers with a STEM or special education specialty (regardless of degree level) were more likely to leave their profession than teachers with general education or other specialties. Indeed, teachers with majors in STEM fields, compared to teachers with other majors, generally have stronger wage incentives and job opportunities outside of the teaching profession (Hansen, Breazeale, & Blakenship 2019; cf. Goldhaber et al. 2024). Similarly, teachers with graduate degrees from pedagogy-focused colleges of education may face different opportunity structures compared to those with degrees from disciplinary departments.

Conclusion

States and school districts have frequently promoted and in some cases required a graduate degree as a strategy for improving teacher quality (Sahlberg, 2015). Given the potential impact of teacher qualification policies on student success, as well as the financial costs associated with graduate education and differential compensation, this report sought to broaden understanding of the national and Midwest landscape of teacher educational attainment as well as the current state of research on student and teacher outcomes.

Nationally, about 60% of public school teachers hold a master's degree, though this proportion varies significantly across states. Additionally, within states, urban, suburban, and higher-income schools tend to have higher rates of master's degree attainment among teachers. Moreover, over 80% of master's degrees are relevant to either general education or specific subjects, as only 12% of teachers' master's degrees are in non-curricular fields such as educational administration. The degree to which a teacher's major field of study aligns with their teaching assignment, or major-subject congruence, varies by school level and subject area. For instance, among teachers with a primary assignment in mathematics, major-subject congruence ranged from 36% among primary, middle, and combined school math teachers to 54% among high school math teachers.

The research literature on the effects of teacher graduate degree attainment (typically master's degrees) points to a complex relationship shaped by methodological design, grade level, subject area, the extent to which the degree aligns with teachers' instructional content, and the types of outcomes measured. Generally, positive effects of in-area graduate degrees have been most consistently documented in STEM subject areas. At the elementary level, most research finds no effect of graduate degrees on student reading outcomes, though

some positive impacts appear for math and science achievement. Middle school studies suggest a positive effect of graduate degrees on student math achievement, while most studies show no effect for reading achievement. In high schools, evidence of a positive impact was strongest for in-area graduate degrees on math achievement, and one study indicated positive effects in science and social studies when teachers acquire in-area degrees.

Across all levels, holding a graduate degree that does not align with a teacher's primary teaching assignment was generally associated with null or negative effects on student achievement, suggesting that major-subject congruence is a critical factor in realizing the potential benefits of graduate teacher qualifications.

Studies on teacher educational attainment beyond test scores suggest broader benefits for student engagement, postsecondary success, and teacher outcomes. For instance, emerging research indicates that cumulative exposure to teachers with graduate degrees in math and science over multiple years is associated with increased odds of students completing a postsecondary credential after high school. Graduate education can also benefit teachers directly: those with graduate degrees, particularly in-area degrees, tend to receive higher principal evaluation ratings and report greater self-efficacy in instructional practices and classroom management. Finally, teachers with graduate degrees are, on average, just as likely to remain in the profession as those with only a bachelor's degree.

As states and school districts refine their policies on teacher educational attainment, the findings of this report highlight key areas for strategic improvement. By defining policy objectives, facilitating better major-subject alignment, strengthening teacher preparation programs, broadening effectiveness measures, and improving data collection and outcomes assessment, states can enhance teacher education policies related to graduate education.

- **Defining Policy Objectives.** To better align incentives, evaluation frameworks, and outcomes, states and districts can consider adopting a more targeted approach to promoting teacher graduate education, one grounded in clearly defined policy objectives and attentive to differences by school level, subject area, and teachers' career goals and trajectories. A key priority is to clarify whether the primary aim of graduate education incentives is to strengthen classroom instruction or to cultivate leadership and administrative capacity within the education system. Instructional improvement objectives would warrant support for graduate education and evaluation metrics focused on subject-matter expertise, pedagogical practice, and demonstrated classroom effectiveness. In contrast, leadership-oriented objectives would be better served by degrees in educational administration and organizational development, alongside metrics tied to leadership placement and performance. When such objectives remain ambiguous, policymakers may inadvertently subsidize graduate degrees that yield limited or even negative effects on the intended outcomes, thereby diminishing the return on investment in public education.
- **Promoting In-Area Majors.** While research findings on major-subject congruence vary by school level and subject, current evidence suggests that subject-aligned graduate degrees can improve instructional effectiveness, particularly in STEM subject areas. Moreover, the impact of sustained exposure to teachers with in-area subject expertise may accumulate over multiple years, potentially shaping students' educational and professional trajectories. Conversely, out-of-area graduate degrees such as those in school administration are most often associated with null or negative effects on student achievement. Accordingly, when the objective is instructional improvement, states and school districts can enhance the impact of graduate degree attainment by incentivizing enrollment in graduate programs that align with teachers' classroom subject areas. This prioritization can also be supported by providing prospective and current teachers with clear data and guidance on how different graduate major choices may affect both teacher and student outcomes.
- **Strengthening Graduate Teacher Preparation.** Initial research suggests that variation in the quality and relevance of graduate teacher prepa-

ration programs may contribute to inconsistent effects of graduate degree attainment. To strengthen the impact of graduate education, states and school districts, in partnership with accreditation agencies and universities, can establish clear quality standards to ensure coursework aligns with evidence-based instructional practices, subject-specific content, and practice-based learning experiences. As part of a continuous improvement strategy, institutions can also systematically gather and incorporate teacher feedback about the utility, relevance, and instructional impact of their graduate coursework.

- **Broadening Effectiveness Measures.** Strengthening teacher quality policies may require moving beyond single measures such as graduate degree attainment. While graduate degree status remains relevant, additional indirect indicators associated with student outcomes – such as years of experience, alignment between a teacher's degree and subject area, and National Board for Professional Teaching Standards (NBPTS) certification – can also help gauge relevant knowledge and skills, while more direct measures such as content and pedagogical knowledge assessments, structured classroom evaluations, and value-added scores offer stronger evidence of instructional effectiveness, particularly in tested subjects such as math, reading, and science.
- **Improving Data Collection and Reporting.** A significant barrier to understanding the impact of graduate education on teacher effectiveness is the lack of comprehensive data. Improving teacher preparation policies requires detailed tracking of teacher education history, including undergraduate and graduate majors/minors, subject-specific coursework and credit accumulation, and the field and level of courses taught (including dual enrollment). Additionally, tracking key short- and longer-term outcomes – such as student engagement and achievement, college and workforce success, and teacher retention – would provide a more complete picture of student and teacher impacts. By integrating this data into a statewide longitudinal data system, states can enable more rigorous analyses of how graduate education influences teaching quality and student outcomes.

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Addendum

Academic Major Classification for Table 5

General Education Fields

1. Early childhood or pre-K, general
2. Elementary grades, general
3. Middle grades, general
4. Secondary grades, general
5. Curriculum and instruction
6. Educational psychology
7. Other non-subject-matter-specific education

Special Education

1. Special education, any

English & Language Arts

1. English
2. Communications
3. Composition
4. Journalism
5. Reading
6. Speech
7. Literature or literary criticism
8. Language arts
9. Linguistics
10. ESL or bilingual education: General
11. ESL or bilingual education: Spanish
12. ESL or bilingual education: Other

STEM

1. Mathematics
2. Computer science
3. Statistics and probability
4. Biology or life sciences
5. Chemistry
6. Earth sciences
7. Engineering
8. Physics
9. Other natural sciences

Arts, Humanities, and Social Sciences

1. Art or arts and crafts
2. Music
3. Drama or theater
4. Dance
5. Architecture
6. Art history
7. Religious studies
8. Philosophy
9. History
10. International studies
11. Law
12. Native American studies
13. Humanities or liberal studies
14. Area or ethnic studies
15. Cultural studies
16. French
17. German
18. Latin
19. Spanish
20. Other foreign language
21. Social studies, general
22. Anthropology
23. Criminal justice
24. Economics
25. Geography
26. Government or civics
27. Political science
28. Psychology
29. Sociology
30. Other social sciences

Technical Education

1. Agriculture and natural resources
2. Industrial arts or technology education
3. Other career or technical education
4. Communications and related technologies
5. Personal and public services
6. Business support
7. Marketing and distribution
8. Healthcare occupations
9. Construction trades
10. Mechanics and repair
11. Manufacturing or precision production
12. Family and consumer sciences education
13. Business management
14. Military science

Administration/Support

1. Administration
2. Policy studies
3. Counseling and guidance
4. School psychology
5. Library or information science

Other

1. Health education
2. Physical education
3. Other

Academic Major Classification by Field Taught for Congruence Tables 6 and 7

Pre-K through Middle General

- Majors and Fields Taught: Early childhood or pre-K, general; Elementary grades, general; Middle grades, general

Secondary Grades, General

- Major only: Secondary grades, general

Other, General

- Majors only: Curriculum and instruction; Educational psychology; Other non-subject-matter-specific education

Special Education

- Majors and Fields Taught: Special education, any

English & Language Arts

- Majors: English; Communications; Composition; journalism; Reading; speech; Literature or literary criticism; Language arts; Linguistics; ESL or bilingual education: General; ESL or bilingual education: Spanish; ESL or bilingual education: Other
- Fields Taught: Communications; Composition; English; Journalism; Language arts; Literature or literary criticism; Reading; Speech; ESL or bilingual education: General; ESL or bilingual education: Spanish; ESL or bilingual education: Other

Arts and Humanities

- Majors: Art or arts and crafts; Music; Drama or theater; Dance; Architecture; Art history; Religious studies; Philosophy; History; International studies; Law; Native American studies; Humanities or liberal studies; Area or ethnic studies (excluding Native American studies); Cultural studies; French; German; Latin; Spanish; Other foreign language
- Fields Taught: Art or arts and crafts; Art history; Dance; Drama or theater; Music; French; German; Latin; Spanish; Other foreign language; Area or ethnic studies (excluding Native American studies); History; Native American studies; Philosophy; Religious studies, theology, or divinity

Mathematics

- Majors: Mathematics, Statistics and probability
- Fields Taught: Algebra I; Algebra II; Algebra III; Basic and general mathematics; Business and applied math; Calculus and pre-calculus; Geometry; Pre-algebra; Statistics and probability; Trigonometry

Science and Engineering

- Majors: Biology or life sciences; Chemistry; Earth sciences; Engineering; Computer science; Physics; Other natural sciences
- Fields Taught: Computer science; Science, general; Biology or life sciences; Chemistry; Earth sciences; Engineering; Integrated science; Physical sciences; Physics; Other natural sciences

Social Sciences

- Majors: Social studies, general; Anthropology; Criminal justice; Economics; Geography; Government or civics; Political science; Psychology; Sociology; Other social sciences
- Fields Taught: Social studies, general; Anthropology; Economics; Geography; Government or civics; Political Science; Psychology; Sociology; Other social sciences

Technical Education

- Majors: Agriculture and natural resources; Industrial arts or technology education; Other career or technical education; Communications and related technologies (including design, graphics, or printing; not including computer science); Personal and public services (including culinary arts, cosmetology, child care, social work, protective services, custodial services, and interior design); Business support; Marketing and distribution; Healthcare occupations; Construction trades, engineering, or science technologies (including CADD and drafting); Mechanics and repair; Manufacturing or precision production (electronics, metalwork, textiles, etc.); Family and consumer sciences education; Business management; Military science or ROTC
- Fields Taught: Agriculture and natural resources; Business management; Business support; Marketing and distribution; Healthcare occupations; Construction trades, engineering, or science technologies; Mechanics and repair; Manufacturing or precision production; Communications and related technologies; Personal and public services; Family and consumer sciences education; Industrial arts or technology education; Other career or technical education; Driver education; Military science or ROTC

Health/Physical Ed

- Majors: Health education; Physical education
- Fields Taught: Health education; Physical education

Administration/Support

- Majors only: Administration; Policy studies; Counseling and guidance; School psychology; Library or information science

Other

- Majors: Other
- Fields Taught: Library or information science; Other

MIDWESTERN HIGHER EDUCATION COMPACT

Compact Leadership

President
Susan Heegaard

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Mission

MHEC brings together leaders from Midwestern states to develop and support best practices, collaborative efforts, and cost-sharing opportunities. Through these efforts, MHEC works to ensure strong postsecondary educational opportunities and outcomes for all.

Vision

To improve student success and regional economic vitality through collective problem-solving and partnerships that strengthen postsecondary education.

Values

Collaboration. We believe working together in an open, respectful environment creates a foundation for cooperation and innovation that allows us to research, share, pilot, and scale ideas to improve our individual institutions, states, and region.

Innovation. We believe that bringing creativity, research, and problem solving to the challenges and opportunities in higher education helps produce new ideas and excellent results for our states, institutions, and students.

Access & Attainment. We believe that addressing obstacles to higher education opens opportunity for students from all backgrounds and helps institutions advance student success.

Excellence. We believe that high standards combined with intentional and efficient use of our resources produce valuable outcomes for our member states and their respective institutions.